

Bell Work

8-Sept-2017

For example if you weigh out gold jewelry to sell for extra cash and the scale being used reads to the decigram (XXX.Xg) and you record 28.4g at a price of \$43.3/ gram, how much money should you get?

What if the actual weight was 28.44g, were you shorted?

Objective

You will be able to round number based on significant figure rules.

Significant figures



There are 2 kinds of numbers:

Exact: the amount of money in your account.
Known with certainty. Anything *COUNTED*


Approximate: weight, height—anything
Measured. No measurement is perfect.

Recall

A. Exact numbers are obtained by

1. using a measuring tool
2. counting 
3. definition 

B. Measured numbers are obtained by

1. using a measuring tool 
2. counting
3. definition

Practice

Classify each of the following as an exact or a measured number.

1 yard = 3 feet

The diameter of a red blood cell is 6×10^{-4} cm.

There are 6 hats on the shelf.

Gold melts at 1064°C .

When to use Sig Figs

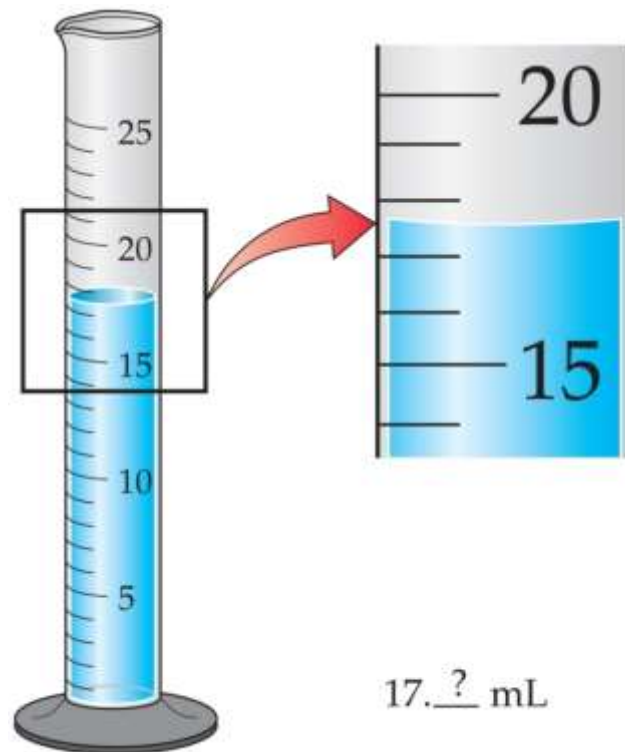
When a measurement is recorded only those digits that are **dependable** are written down.

Every experimental measurement has a degree of uncertainty.

The volume, V , at right is certain in the 10's place, $10\text{mL} < V < 20\text{mL}$

The 1's digit is also certain, $17\text{mL} < V < 18\text{mL}$

A best guess is needed for the tenths place.



Another Example

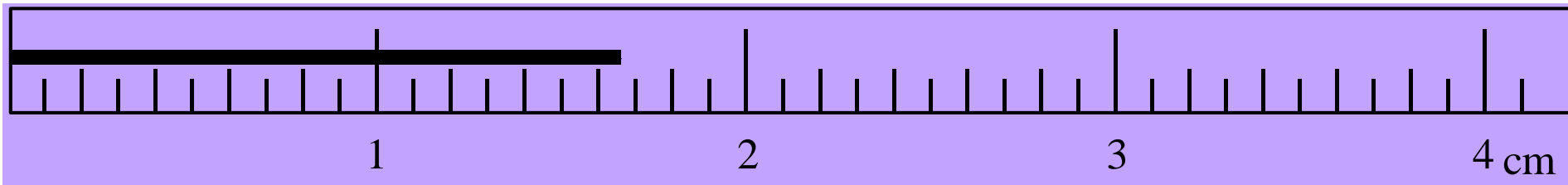
We can see the markings between 1.6-1.7cm

We can't see the markings between the 0.6-0.7

We must guess between 0.6 & 0.7

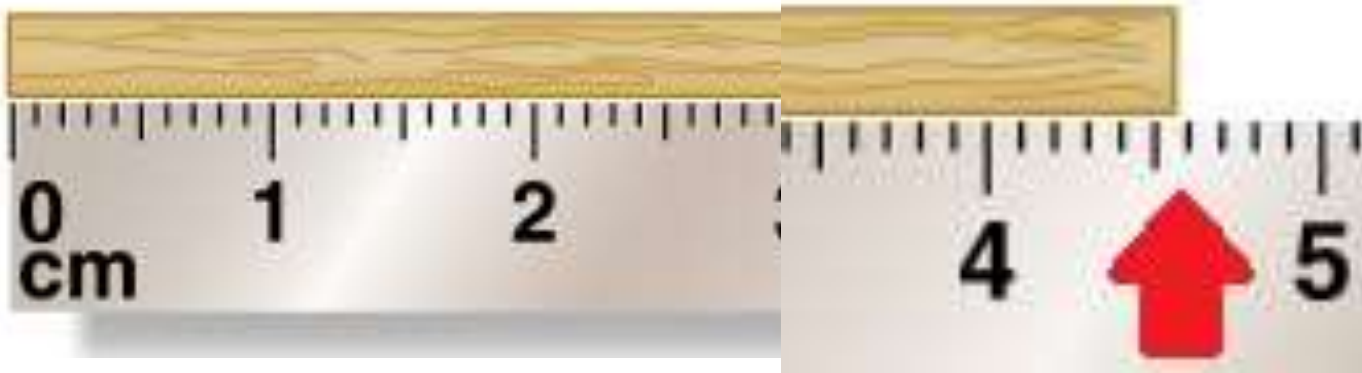
We record 1.67 cm as our measurement

The last digit an 7 was our guess...stop there



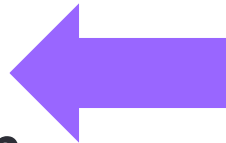
Your Turn

Measured Numbers have error...you have to make that Guess!



What is the length of the wooden stick?

- 1) 4.5 cm
- 2) 4.54 cm
- 3) 4.547 cm



Recorded Numbers

Uncertain digit
54.07 g A mass between 54.06 g and 54.08 g (± 0.01 g)

Uncertain digit
54.071 38 g A mass between 54.071 37 g and 54.071 39 g ($\pm 0.000\ 01$ g)

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All but one of the significant figures are known with certainty. The last sig. fig. is only to the best possible estimate.

To indicate the precision of a measurement, the value recorded should use all the digits known with certainty.

The Rules

RULE 1. Zeros in the middle of a number are like any other digit; they are always significant.

Ex. 45.081 g has five significant figures.

RULE 2. Zeros at the beginning of a number are not significant; they act only to locate the decimal point.

Ex. 0.0537 cm has three significant figures,
and 0.069 01 mL has? **4**

The Rules cont.

RULE 3. Zeros at the end of a number and *after* the decimal point are significant. It is assumed that these zeros would not be shown unless they were significant.

Ex. 527.700 m has six significant figures.

If the value were known to only four significant figures, we would write 527.7 m.

The Rules cont.

RULE 4. Zeros at the end of a number and *before* an implied decimal point may or may not be significant. We cannot tell whether they are part of the measurement or whether they act only to locate the unwritten but implied decimal point.


Ex. 280 000km has 2 sig. figs.

How Many Sig Figs?

- a. 45.8736
- b. 0.000239
- c. 0.00023900
- d. 48000.
- e. 48000
- f. 3.982×10^6
- g. 1.00040

Scientific Notation

When ever you are unsure – convert to scientific notation

$$215. = 2.15 \times 10^2$$



Decimal point is moved two places to the left, so exponent is 2.

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$$3.7962 \times 10^4 = 37,962$$


Positive exponent of 4, so decimal point is moved to the right four places.

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$$1.56 \times 10^{-8} = 0.000\,000\,015\,6$$


Negative exponent of -8 , so decimal point is moved to the left eight places.

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Practice

1. Indicate how many significant figures there are in each of the following measured values.

246.32	5 sig figs	1.008	4 sig figs	700000	1 sig fig
107.854	6 sig figs	0.00340	3 sig figs	350.670	6 sig figs
100.3	4 sig figs	14.600	5 sig figs	1.0000	5 sig figs
0.678	3 sig figs	0.0001	1 sig fig	320001	6 sig figs

2. Calculate the answers to the appropriate number of significant figures.

$$\begin{array}{r} 32.567 \\ 135.0 \\ + 1.4567 \\ \hline 169.0 \end{array}$$

$$\begin{array}{r} 246.24 \\ 238.278 \\ + 98.3 \\ \hline 582.8 \end{array}$$

$$\begin{array}{r} 658.0 \\ 23.5478 \\ + 1345.29 \\ \hline 2026.8 \end{array}$$

3. Calculate the answers to the appropriate number of significant figures.

- | | | | | | |
|-----------------------------------|---|-------------|-------------------------|---|--------------------------------------|
| a) 23.7×3.8 | = | <u>90.</u> | e) 43.678×64.1 | = | <u>2.80×10^3</u> |
| b) 45.76×0.25 | = | <u>11</u> | f) $1.678 / 0.42$ | = | <u>4.0</u> |
| c) $81.04 \text{ g} \times 0.010$ | = | <u>0.81</u> | g) $28.367 / 3.74$ | = | <u>7.58</u> |
| d) 6.47×64.5 | = | <u>417</u> | h) $4278 / 1.006$ | = | <u>4252</u> |

Adding and Subtracting

Rule: When adding or subtracting measured numbers, the answer can have no more places after the decimal than the **Least** of the measured numbers.

Practice

$$5.45\text{cm} + 2.3\text{cm} = 7.75\text{cm},$$

$$\text{Round off to} \quad = 7.8\text{cm}$$

You try:

$$7.432\text{cm} + 2\text{cm} =$$

$$9.432 \text{ round to} \quad \rightarrow 9\text{cm}$$

Multiplications and Division

Rule: When multiplying or dividing, the result can have no more significant figures than the **least** reliable measurement.

Practice

$$56.78 \text{ cm} \times 2.45 \text{ cm} = 139.111 \text{ cm}^2$$

Round to $\rightarrow 139 \text{ cm}^2$

$$75.8 \text{ cm} \times 9.6 \text{ cm} = ?$$

Home Work 8Sept17: Pre Lab Density

**Use as many
piece of paper
as you need, try
not to write on
both side.**

Analysis and conclusions should be recorded at the end of the pre lab after the lab

Name

Period

Date

Title

Purpose/ Objective:

Safety:

Pre lab Calculations:

Procedures

Observations

Data Table:

Bell Work
11-Sept-2017 Pre - AP

Why was failing your last test in here a good thing, what are the positives of failure.

If you earned an "A" what did you do in preparation to secure that grade.

EQ: Why is knowing how to fail as important if not more important than succeeding?

Objective

You will be able to determine the density of a metal after finding its mass and volume.

You will learn a fast method for finding volume.

Volume

How do you get the volume of a brick?

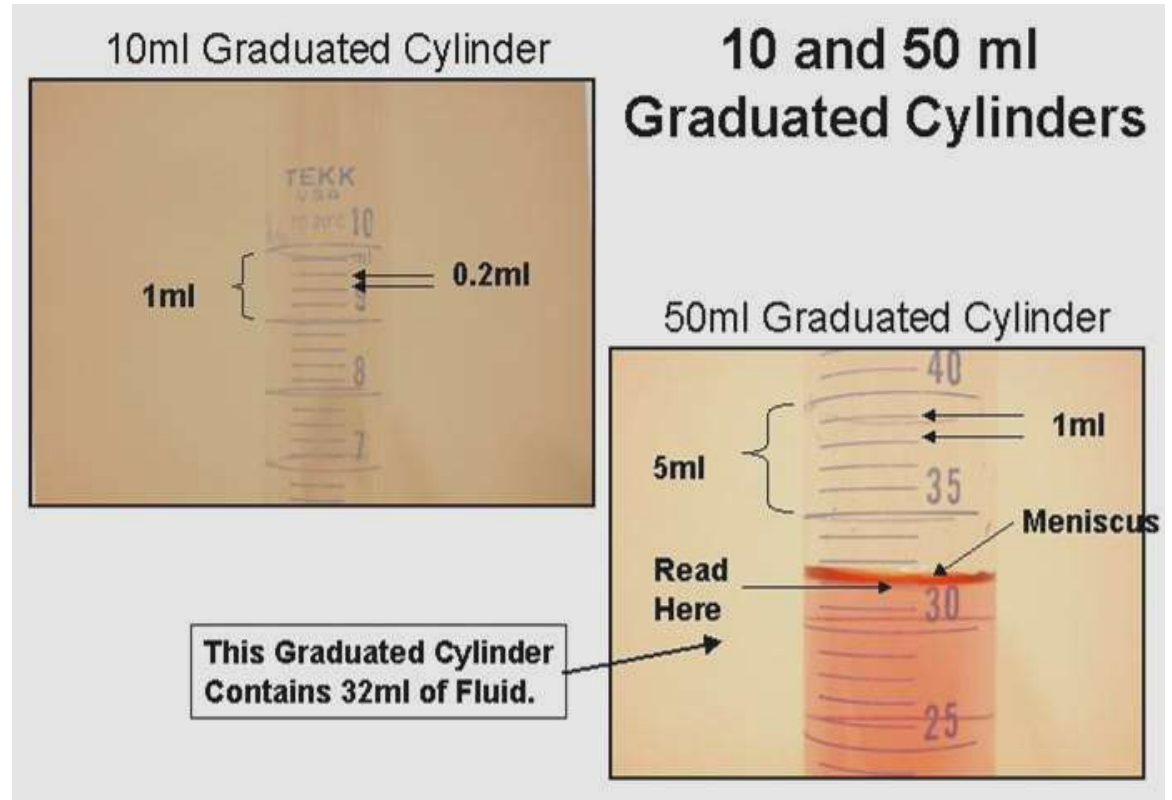


What about a rock?



Reading a Graduated Cylinder

What do you think is the volume of the solution in your graduated cylinder?



Density Lab

*There are eight (8) different metals, A-H,
you will work each and rotate through
the lab*

Each metal type needs a minimum of three (3)
different samplings of volume and mass.

Dry metals before weighing, all sphere metals
use weigh boats

Density Lab

Safety: **Do Not** touch the lead, Pb, with your fingers or hand. No Toces El Plomo

When using the Pb / "G" use 15 balls at a time.

So 15, 30, 45, _____ etc. when measuring

Follow directions!

When finished, record data on board for class to copy down for graphs.

Actual Density Values for percent Error

1. Person from each group:

**Please come up to board and enter any
one of your values you measured for
each sample**

**2. Take a picture or look up data
on class website in power
point section**

Average Vol. & Mass Period 1

Period 1		Mass and Volume data Density Pre AP Chemistry					
Sample	A1		A2		B		C
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g) Vol.(cm3)
1							
2							
3							
4							
5							
Sample	D1		D2		E1		E2
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g) Vol.(cm3)
1							
2							
3							
4							
5							
Sample	F		G1		G2		
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	
1							
2							
3							
4							
5							

Before you leave...

What laboratory tool could you use to find the volume of a metal nut?

How would you carry out the measurement?

What should you be sure to do to insure the volume is measured correctly?



When finished record data on board for class to copy down for graphs.

Email graph to: william.golden@fwusd.org

Subject: P.X.LastName.FirstName.Density

Recap

What did we do in the lab Friday day?

What two (2) measurements did we make?

Intensive property: Independent of the quantity or amount (Melting point, density, Molar Mass, etc.)

Extensive property: Depends on the amount. (Mass, volume, temperature, measurements)

Bell work

13-Sept-2017

- A. Log on to a computer and go to the class website.
- B. Once there get out your Density Lab handout and data.

EQ: Why is knowing how to fail as important if not more important than succeeding?

Agenda:

Use data from density lab to develop a series of line graphs on excel which show density as slope

Actual Density Values for percent Error 2017

A_{1&2}: 0.75g/cm³

B: Al 2.7g/cm³

C: SiO₂ g/cm³

D₁ :Cu 8.96g/cm³

D₂ :Cu 7.18g/cm³

D₃ :Cu 8.83g/cm³

E_{1&2}: Steel 8.05 g/cm³

F: FeS₂ 5.02g/cm³

G_{1&2}: Pb 11.34g/cm³

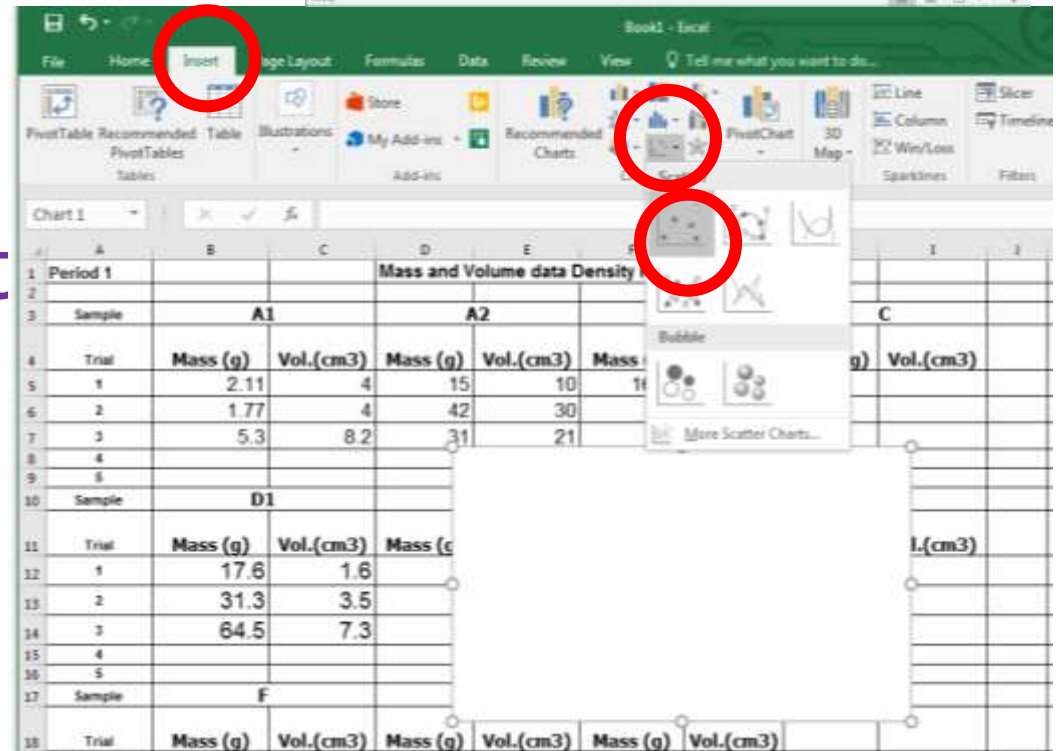
Graphing in Excel 2016

Making your Graph

1. Enter you data in the spread sheet.

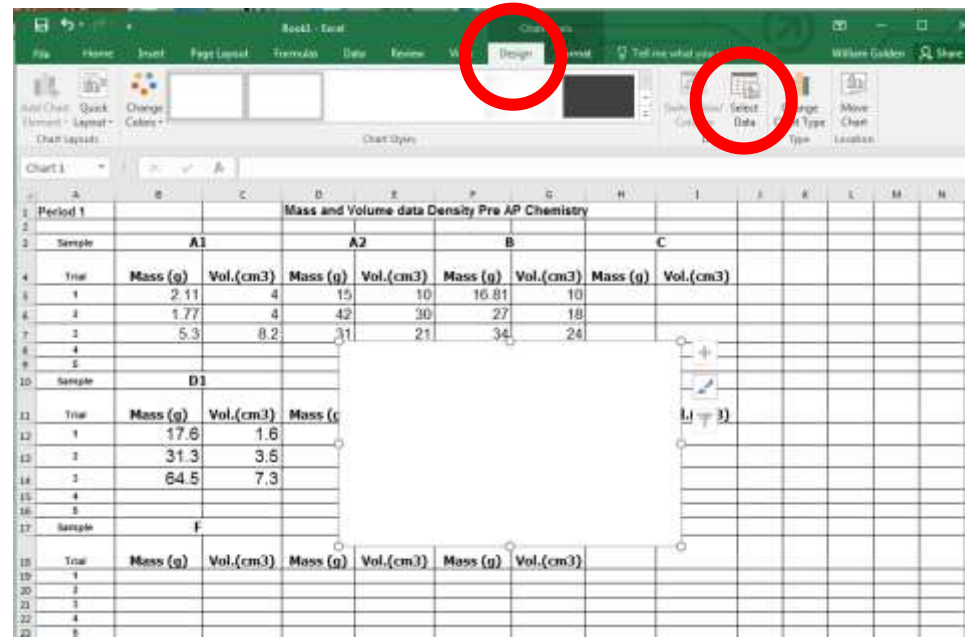
Period 1		Mass and Volume data Density Pre AP Chemistry							
Sample		A1		A2		B		C	
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	
1	2.11	4	15	10	16.81	10			
2	1.77	4	42	30	27	18			
3	5.3	8.2	31	21	34	24			
4									
5									
Sample		D1		D2		E1		E2	
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	
1	17.6	1.6							
2	31.3	3.5							
3	64.5	7.3							
4									
5									
Sample		F		G1		G2			
Trial	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)	Mass (g)	Vol.(cm3)			
1									
2									
3									
4									
5									

2. Go to the "Insert" tab and select "Scatter"

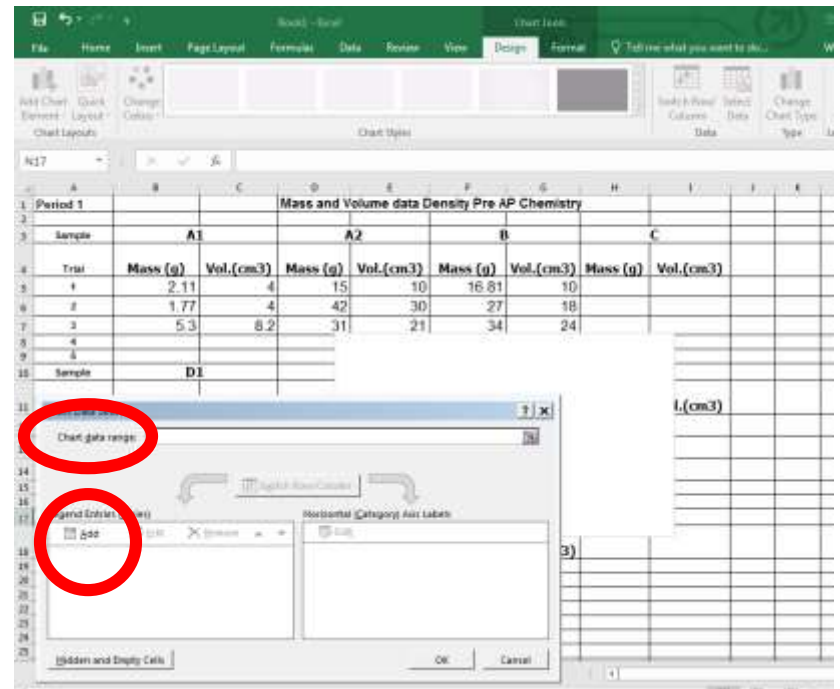


Graph Cont. 2

3. Select "Design"
then "Switch Data"

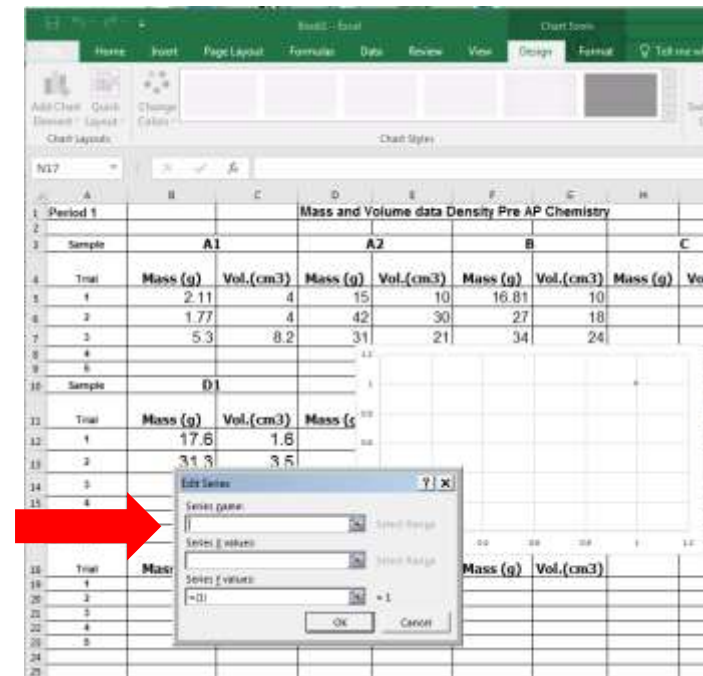


4. Clear Chart Range,
and click "Add"

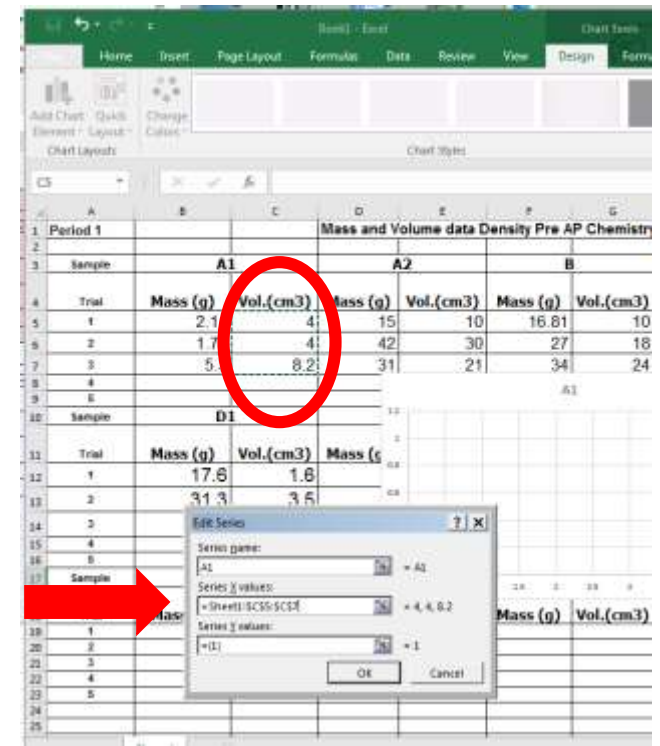


Graph Cont. 3

5. Type in Series name

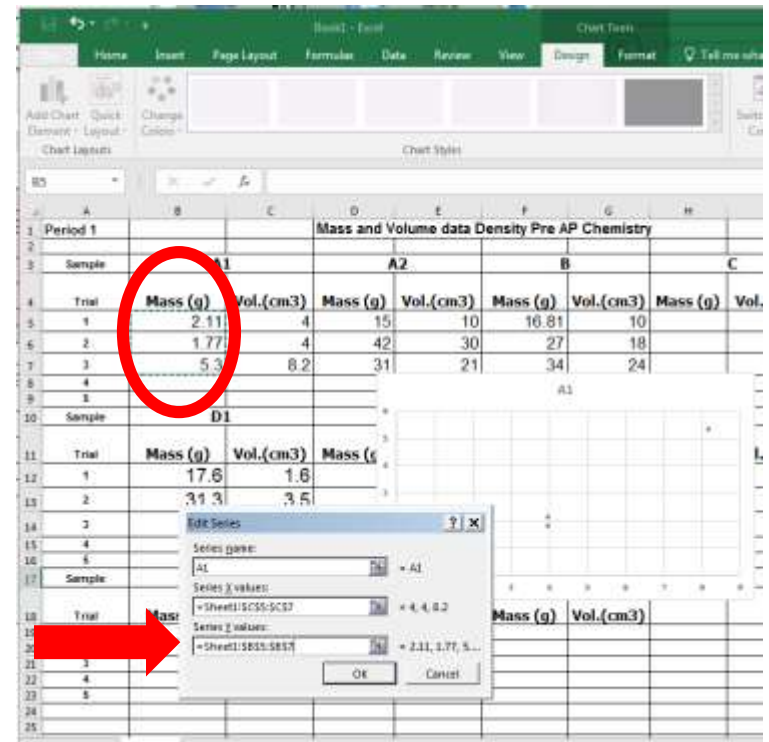


6. Click in "Series X values" and then highlight the x-axis data for metal A

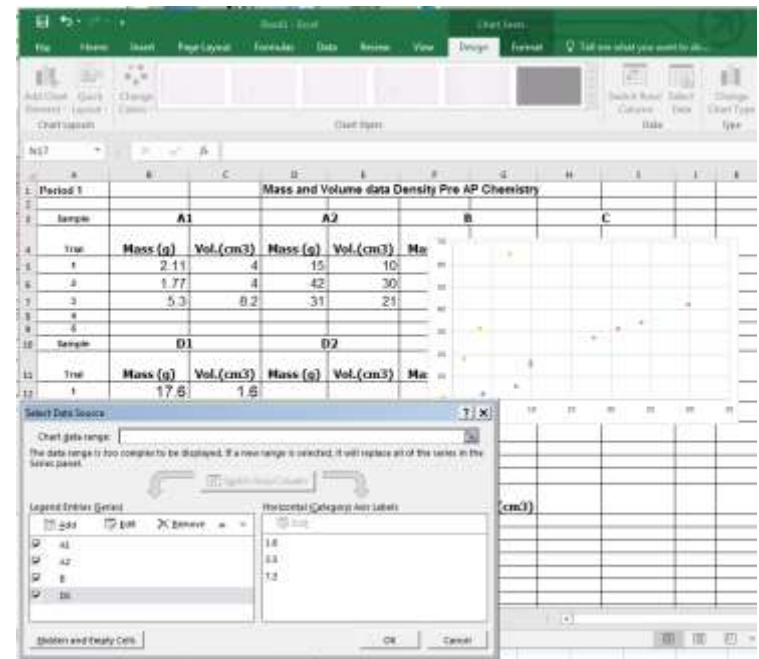


Graph Cont. 4

7. Click in "Series Y values" and, delete " $=\{1\}$ " then high light the y-axis data for metal A

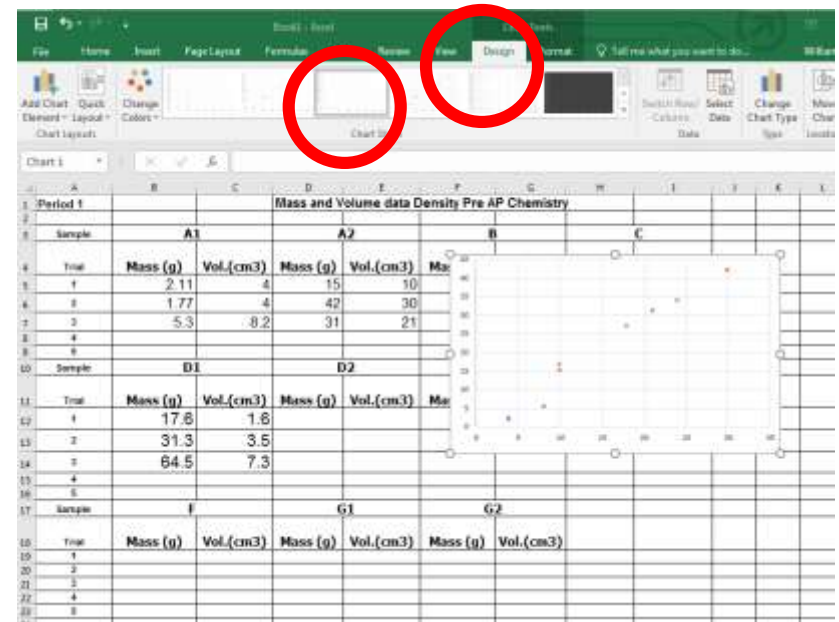


8. Repeat steps 4-7 for each metal

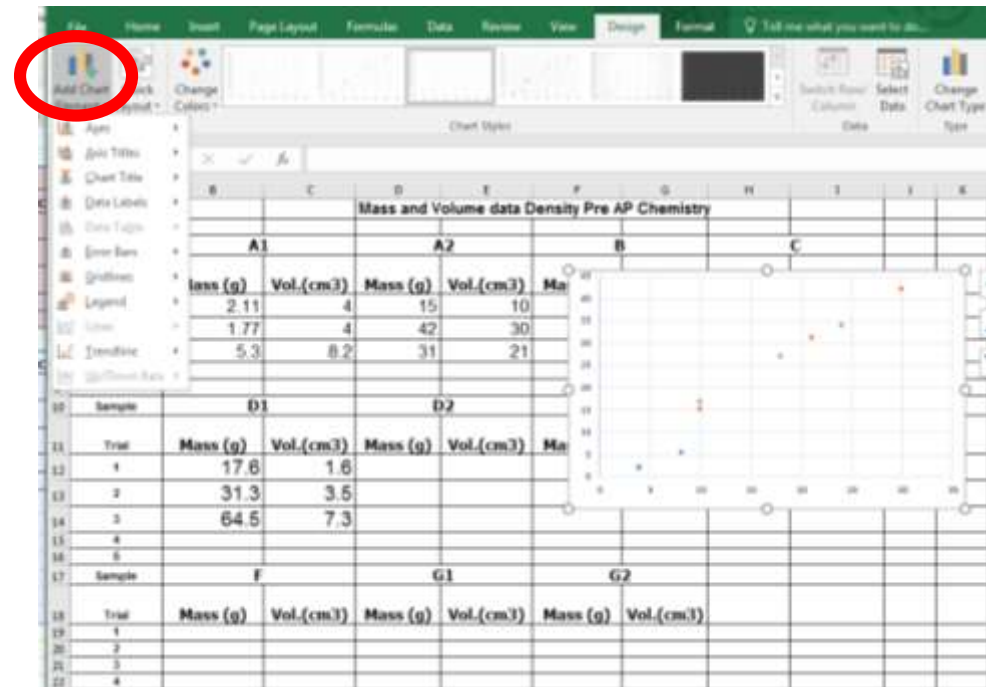


Graph Cont. 5

9. Click on chart then "design", and pick "Style 3"

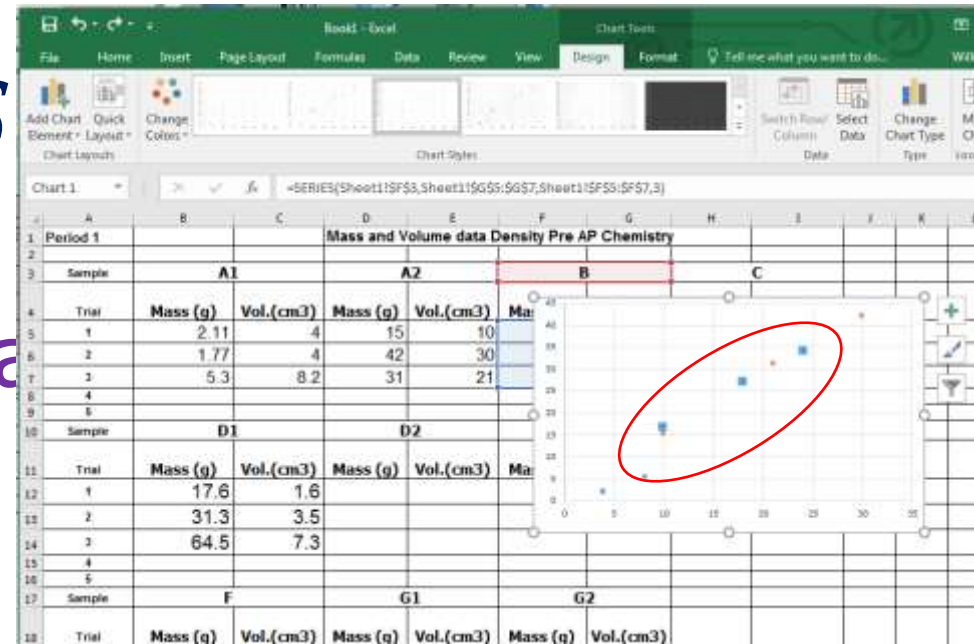


10. Fill in Axis titles and Chart title, you can calculate slope manually Or using excel "=SLOPE()" formula

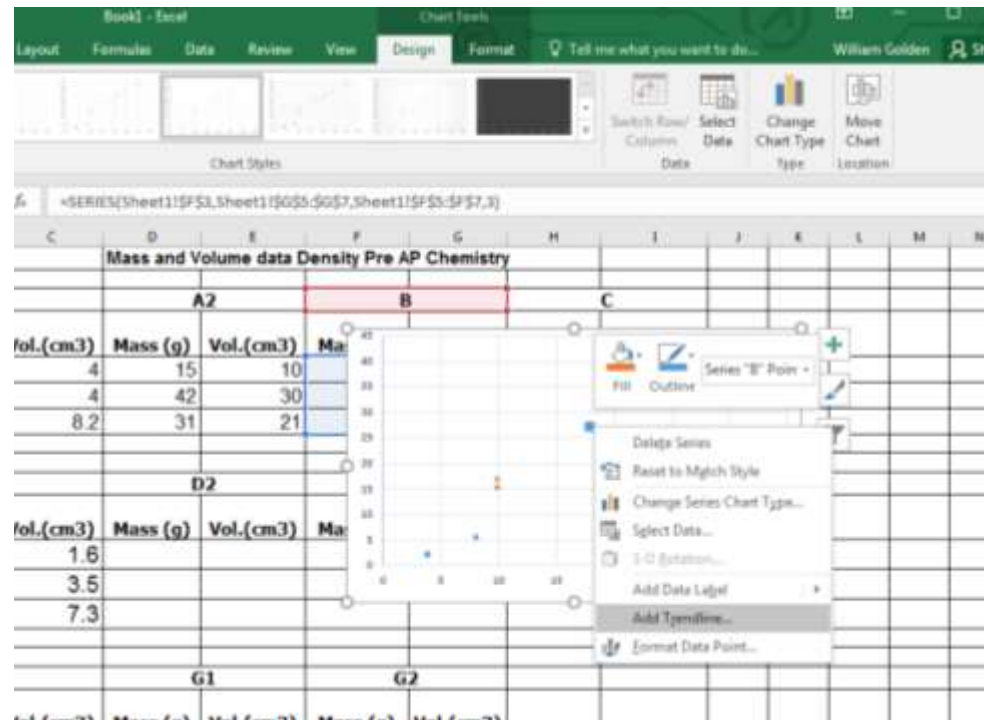


Graph Cont. 6

9. Click on chart then add data plot series



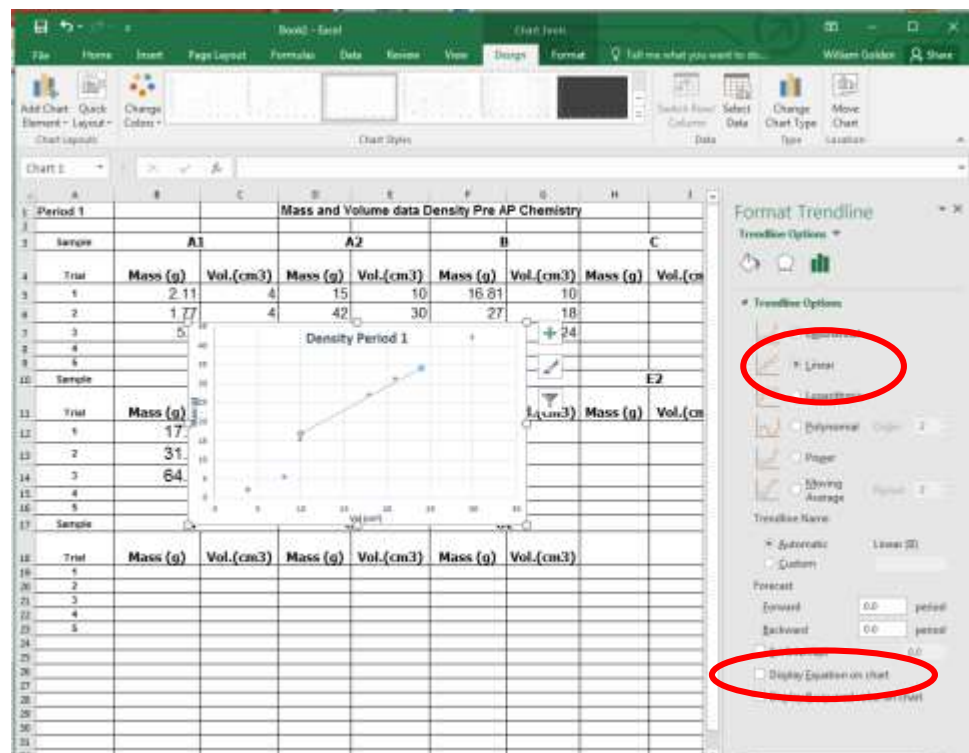
10. Right click data set, then select "Add Trendline..."



Graph Cont. 7

11. In the Format Trendline tool panel select Trendline Option, Linear since our data is linear and check "Display Equation of chart" if needed

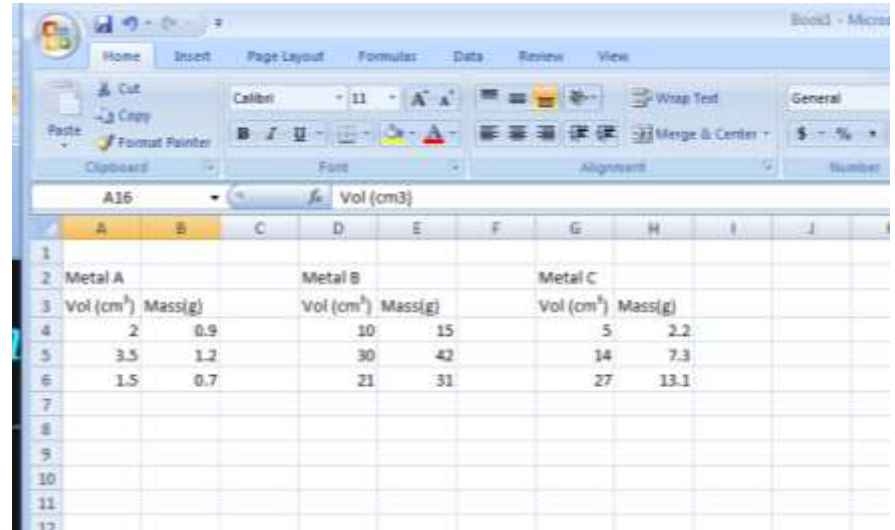
12. Repeat for remaining plots



Graphing in Excel 2010

Making your Graph

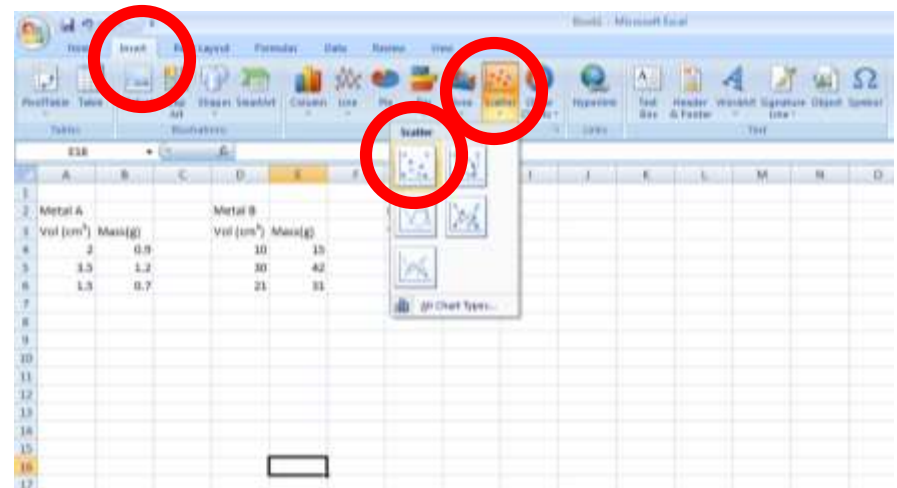
1. Enter your data in the spread sheet.



A screenshot of the Microsoft Excel interface. The 'Home' tab is selected in the ribbon. The active cell is A15, containing the formula '=Vol (cm3)'. The spreadsheet contains data for three metals: Metal A, Metal B, and Metal C. Each metal has two columns: 'Vol (cm³)' and 'Mass(g)'. The data is as follows:

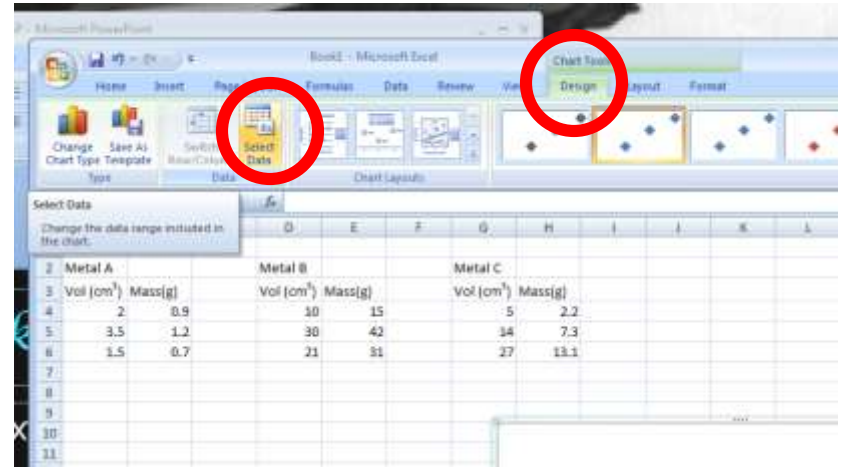
Metal A		Metal B		Metal C	
Vol (cm³)	Mass(g)	Vol (cm³)	Mass(g)	Vol (cm³)	Mass(g)
2	0.9	10	15	5	2.2
3.5	1.2	30	42	14	7.3
1.5	0.7	21	31	27	13.1

2. Go to the "Insert" tab and select "Scatter"

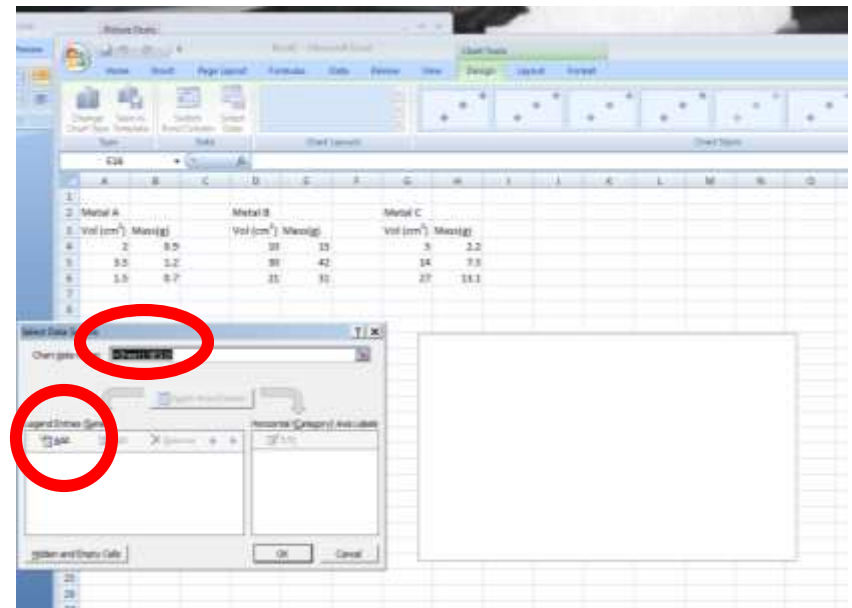


Graph Cont. 2

3. Select "Design" then "Switch Data"

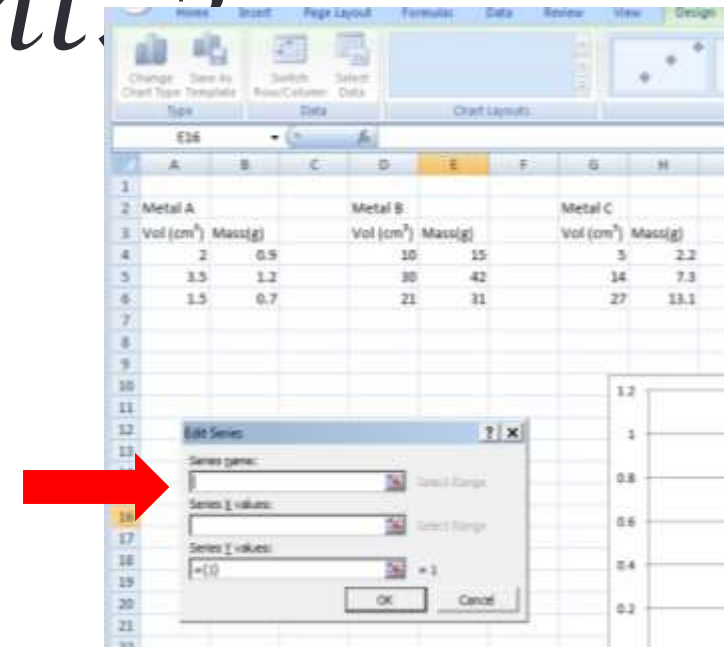


4. Clear Chart Range, and click "Add"

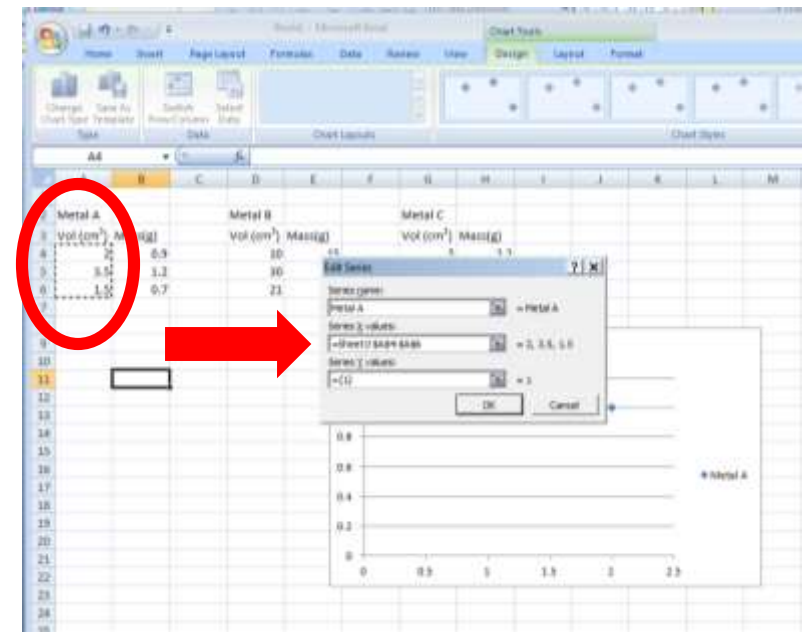


Graph Cont.

5. Type in Series name

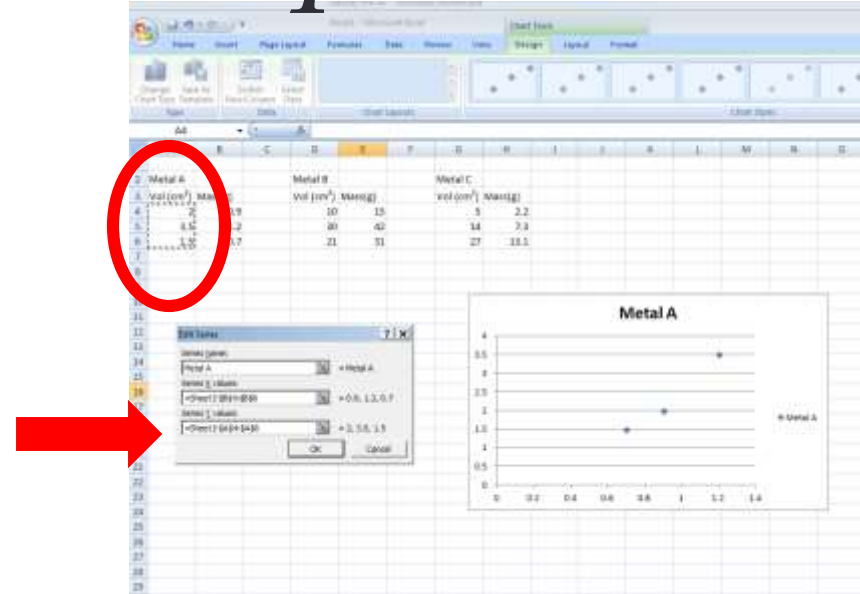


6. Click in "Series X values" and then highlight the x-axis data for metal A

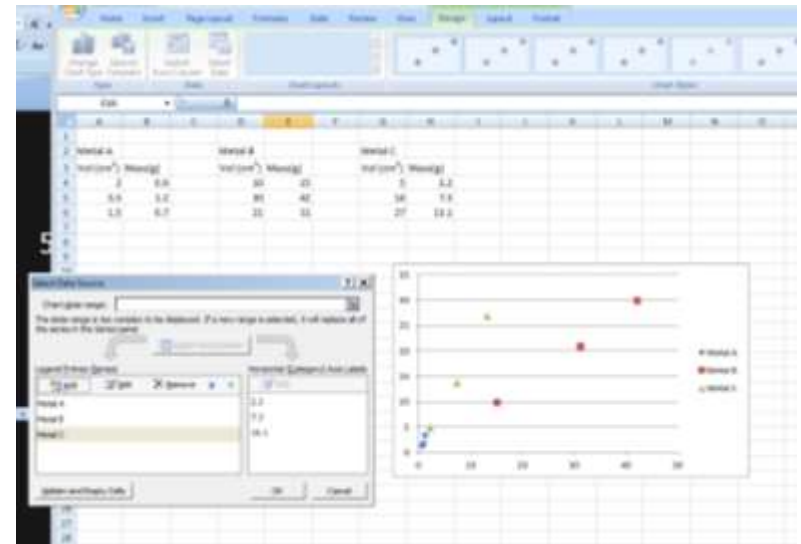


Graph Cont. 4

7. Click in "Series Y values" and, delete " $=\{1\}$ " then high light the y-axis data for metal A

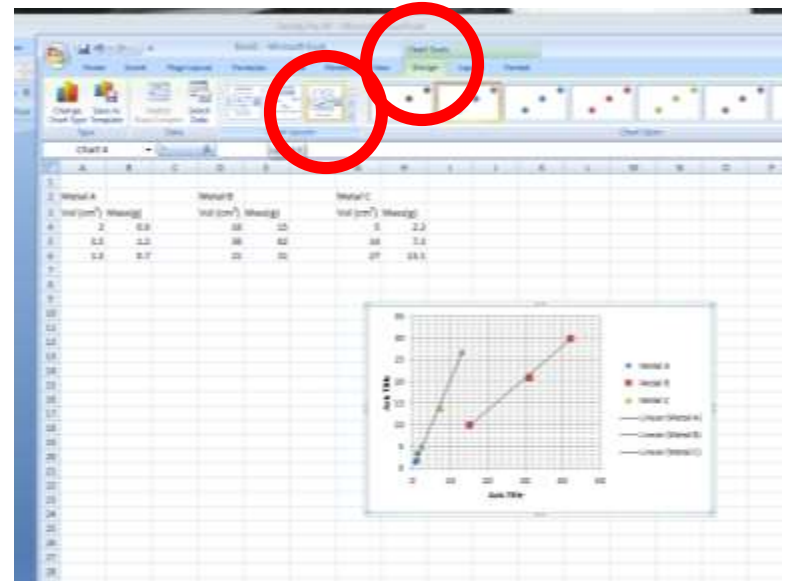


8. Repeat steps 4-7 for each metal



Graph Cont. 6

9. Click on chart then “design”, and pick “layout 3”



10. Fill in Axis titles and Chart title, you can calculate slope manually Or using excel “=SLOPE()” formula

Email Your Graphing

Save as: PX.Lastname.Firstname.Density

Email graph to: william.golden@fwusd.org

Subject: PX.Lastname.Firstname.Density



Must be in exact form or No credit.

Each person needs to send graphs

Due by 4:00pm Monday 18-Sept-2017

Gmail Format

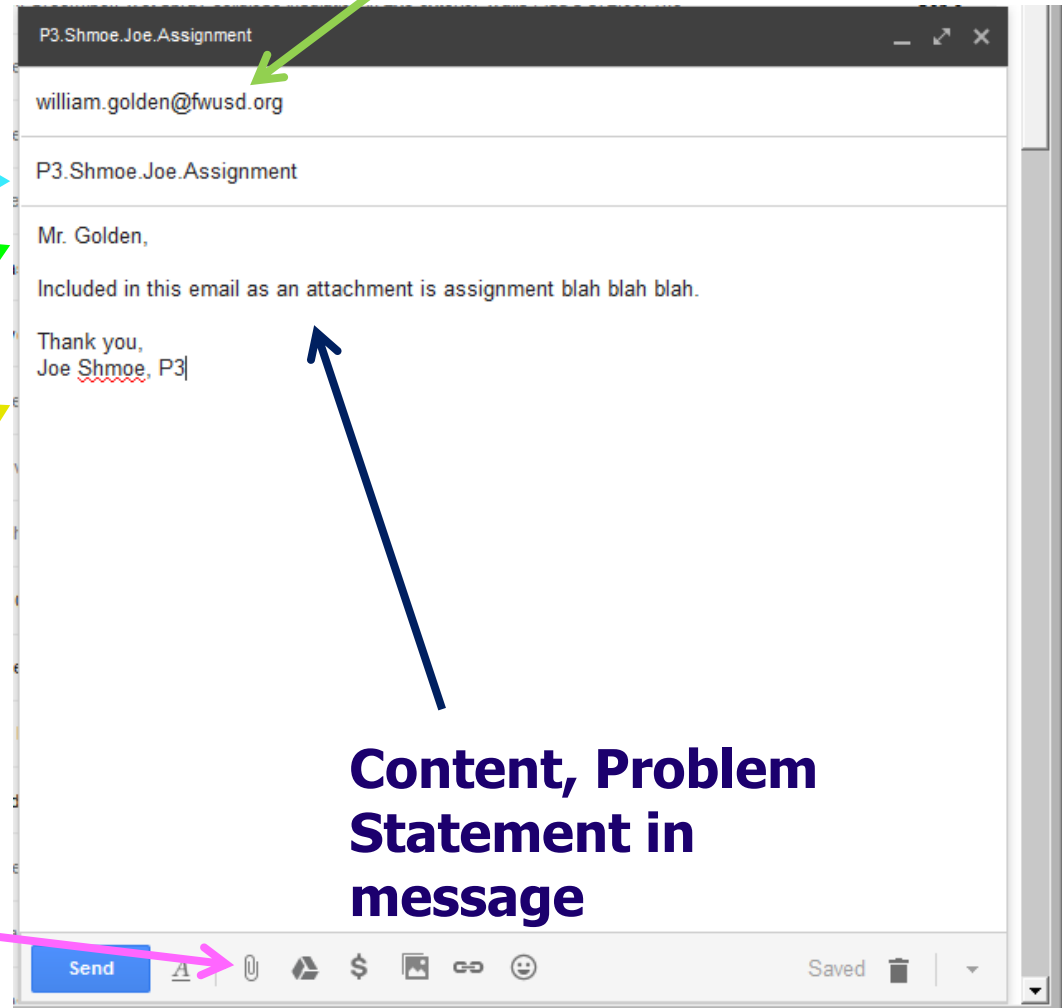
Subject line: "Draft Problem Statement Bridge, Names of group members."

**Salutation/
Greeting,**

**Complementary
Closure and
name**

**Complementary
Closure and
name**

william.golden@fwusd.org



Email Your Graphing

Save as: PX.Lastname.Firstname.Density

Email graph to: william.golden@fwusd.org

Subject: PX.Lastname.Firstname.Density



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